ON TIMBER SCAFFOLDING FOR BUILDINGS.

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From the Proceedings of the Institution of Civil Engineers.)

In adopting the principle of timber scaffolding for buildings, in preference to poles and ropes, Messrs. Grissell and Peto, the contractors, were influenced by considerations of saving both time and expense. They had long been impressed with the want of scientific principle exhibited in the ordinary scaffolding, and were more readily induced to turn their attention to that now referred to, which they believe to be an essential improvement, and calculated to be of considerable advantage to contractors on large works.

The author is well aware of the progress which has recently been made by the civil engineers and architects of this country, but he ventures to claim some share of merit for the practical builders, to whom is committed the execution of the works designed by the engineer and architect; and when a review is taken of the stupendous public works which have been executed within the last few years, it is evident, that without the exercise of great skill, and the introduction of new modes of reducing labour, the amount of work could not have been executed within the time.

The necessity for this reduction of labour on large works had been long felt in the north, and methods had been adopted in consequence, to emulate which, this timber scaffolding was introduced to London. The system had been employed, in rather a rude form, by Mr. Tomkinson of Liverpool, in his quarries and stone yards, for moving stones of large dimensions. Scaffolding of a somewhat similar kind was used in the erection of the Arc de Triomphe, Barrière de l'Etoile, and at the Eglise de la Madeleine, at Paris.*

The first time it was used by the author's firm was for the erection of the Reform Club-house (Pall Mall), under Mr. Barry, in 1838; then at the large graving-dock at her Majesty's Dock-yard, Woolwich, under Mr. Walker (Pres. Inst. C. E.), in 1839; and it is now employed very extensively at the New Houses of Parliament. In these constructions its general applicability was proved, and in the erection of the Nelson Column (commenced in 1840), where it was carried up to the height of 180 feet, its stability at a considerable elevation was fully tested. Its usefulness is manifested by the facilities which it affords to the workmen, particularly in buildings of stone. By its aid, and with the travelling machine at its summit, one mason, or 'setter', can set as much work in one day, as was formerly done in three days; whilst at least six labourers are dispensed with, who, with the old mode of scaffolding, were always required to be in attendance. It is also well known that scaffolding poles and cords are not only expensive, but are subject to rapid decay, and after a few years' wear become useless; in fact, the scaffolding of a moderately extensive building costs a large sum when first purchased, but it is almost valueless after a comparatively short period of time. Such is not the case with the timber scaffolding, which may be said to be of no greater cost to the contractor than the expense of its erection, which will not exceed in any ordinary case three-pence per foot cube. It is not secured together by either bolts or spikes, so that the waste is trifling; and after having performed its duty as a scaffold, it may be removed piecemeal into the building, at the level of each floor, and be used directly for constructing the roof and the internal carpentry of the structure. The timber having become seasoned by its exposure to the weather, is consequently better fitted for immediate use.

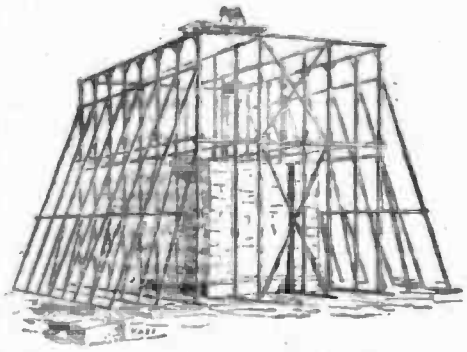
These advantages have been proved in the buildings which have been mentioned, and after an experience of more than five years, the author strongly recommends the adoption of the system. He also advises its use in moving and working large stones, either for permanent erections, or in masons' yards. If used on a wharf the rent would soon be saved in labour, and by allowing the stage to project 8 feet or 10 feet over the river, the scaffolding would be found to answer the purpose of a crane.

The scaffolding at the Nelson Column, designed by Mr. Allen, under whose direction the work was executed, was composed of sills, uprights, cross-heads, longitudinal timbers, braces, and struts, which were used whole, without sawing; the upright timbers were slightly tenoned into the horizontal timbers, and the junctions were secured by iron dogs driven into the timber diagonally across the joints. This mode was preferred to bolts or spikes, on account of the ease with which they could be withdrawn, and because the timber was not injured. The base of the scaffold was 96 feet square, exclusive of the raking-braces; the height of each stage varied from 48 feet to 21 feet, upwards; and the total height was about 180 feet. The total amount of timber in the scaffold was 154 loads, or 7,700 cubic feet, and the cost of its erection was 240*l*.

Its stability was secured, at the height to which it was carried, by using flying windbraces, supported upon cross transoms, running outwards about 6 feet beyond the perpendicular of the scaffold at each stage.

Mr. Nicholson remarked, that a scaffolding of a similar description was used in 1837 by Messrs. Cubitt (Gray's-inn-road), for erecting the entrance gateway of the London and Birmingham Railway (Euston-square).† It was composed of two parallel rows of whole timber uprights, 50 feet high and 17 feet apart, surrounding the building (Fig. 1); these were well stayed by diagonal braces, and a tramway was formed on the top of each row, by horizontal sill pieces, bolted down and secured by plates. The building work was executed by the aid of travelling carriages upon the tramways, and when the masonry had reached the height of the first scaffold, a second series of uprights and sills was added, making the total height 90 feet, which enabled the work to be completed without an accident.

Fig. 1.

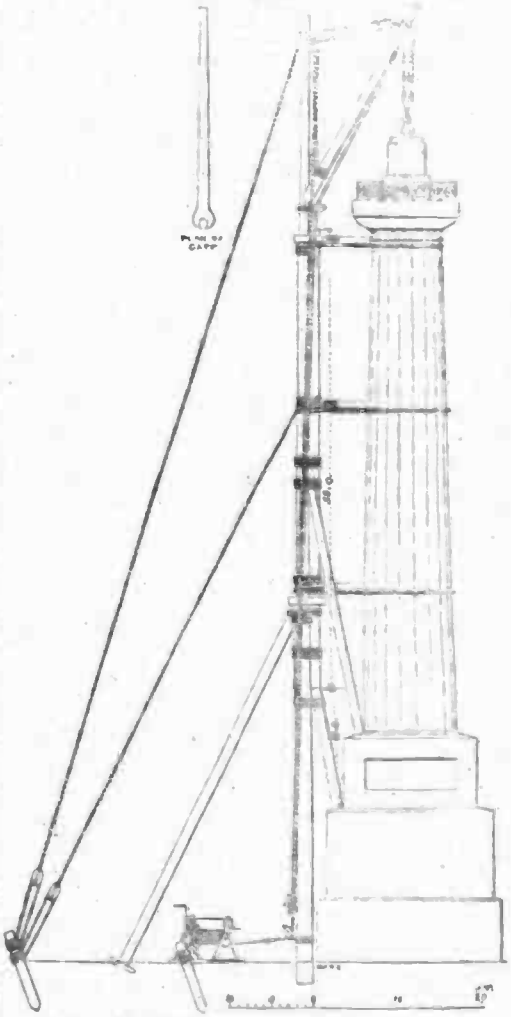


Scaffolding used for building the entrance of the Euston Square Station of the London and Birmingham Railway.

Mr. Harrison believed, that a scaffolding of a somewhat similar construction was used by Messrs. Rennie, at the Victualling-yard at Plymouth, in 1826.

Mr. Rennie said, that the scaffolding employed for raising the statue and other heavy parts of the work, at the Victualling-yard, was on the derrick principle, and was somewhat similar to that used for erecting the Commemoration Column at Devonport (Fig. 2).

Fig. 2.



Derrick used for building the Commemoration Column at Devonport.

Mr. Grissell stated, that when writing the account of the scaffolding at the Nelson Column, that which had been used by Messrs. Cubitt, at the entrance of the London and Birmingham Railway, had entirely escaped his recollection; he now remembered it perfectly, and was happy to have the opportunity of acknowledging that fact. He could not speak too highly in praise of the system, and he thought its advantages had, as yet, been underrated. The waste of timber was comparatively nothing; while serving as scaffolding it was becoming seasoned, and like that at the Nelson Column, could be immediately worked up, in situations demanding dry timber. The cost was one-half, and sometimes one-third, of the ordinary kind of scaffold, if the loss by the rotting and destruction of poles and cords was taken into account. The saving of labour in raising the materials was very great, particularly where weights of from 8 tons to 14 tons were required to be lifted. If steam power had been used at the Nelson Column, a still greater saving would have been effected.

Another considerable advantage was the freedom from danger to the workmen; during five years, in all the works where he had used this kind of

* The square timber scaffolding was employed by Domenic Fontana, in 1586, for the erection of the Egyptian Obelisk in front of St. Peter's at Rome. The means employed in that work are shewn in detail, in engravings, dated 1586, in the possession of Mr. Allen, at the New Houses of Parliament, and they are described with many other methods of using square timber scaffolding for external and internal constructions in the "Contignationes, se pontes Nicolai Zabaglia una cum quibusdam ingeniosis praxibus, ac descriptione translationis obelisci Vaticani, aliorumque, per Equitem Dominicum Fontana suscepta. Romæ, 1743."

† In the "Drawings of the London and Birmingham Railway, by J. C. Bourne" (Ackermann and Co.), two views are given of this scaffolding.